

### Questions and Answers- Making a two dimensional arch flat (page one)

**COST** First off, how much money is available? (Probably yours!) This will decide my materials and also even the hire of somewhere to build and paint it.

**MEASURE** Now I will visit the site where the dance is to take place. How will the arch be supported? What height is available? Where is the entrance? Is it on the same level as the rest of the dance floor? You are working for the youngsters *in* the hall (Those coming through the entrance will not see it until they are in the hall), so where will they congregate? Alright - even if they are milling about everywhere I will still have to decide what angle of the arch is to be seen. (*I shall call our dancers the "audience" from now on*).

Any protuberances on the wall which might get in the way?

Now I measure everything and anything (and even then I always forget something) During all this I get a chance to become acquainted with the caretaker/janitor. You'll need a friendly face on the site.

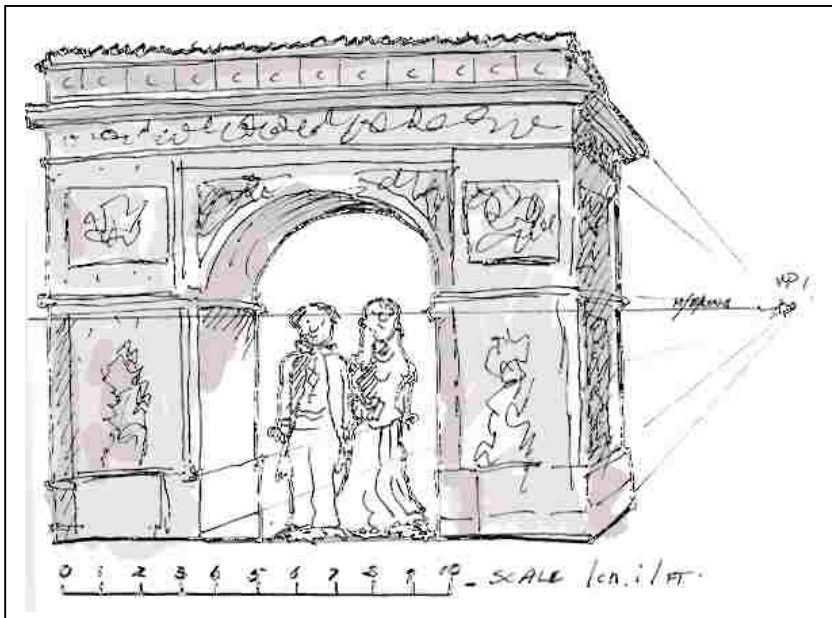
I will then walk the route I plan to take with the scenery through the school, measuring door widths (diagonals) as I go. The arch will come in several sections and be bolted together on site. How near can I get a lorry to the hall? When can I get into the hall?

**PERSPECTIVE** As you have A knowledge of graphics I assume you know about perspective geometry so I am going for a trompe l'oeil effect - we're looking for the "wow" factor here so it has to look "real".

*Let's assume the entrance is on the same level as the dance floor.* Now, at home, I measure from the floor to my child's eyes. (Assuming I have a standard height child! ) That measurement will be my eye line (horizon line). This line would be different if the arch was, say, at the top of some steps leading down into the hall.

**BACK TO THE DRAWING BOARD** Armed with all this knowledge, I research the arch (via Internet search engines) and start fiddling about with pencil and layout paper until I am happy with a design. For the purposes of this exercise I have decided to show a little of the right side of the arch to help the depth illusion. Flat-on would be dead boring. A quick phone call to the organisers to discover how many people are expected to walk through this arch/entrance abreast. *Let's assume two.* And whilst on the phone to them, find out what time they will want everything to be ready by.

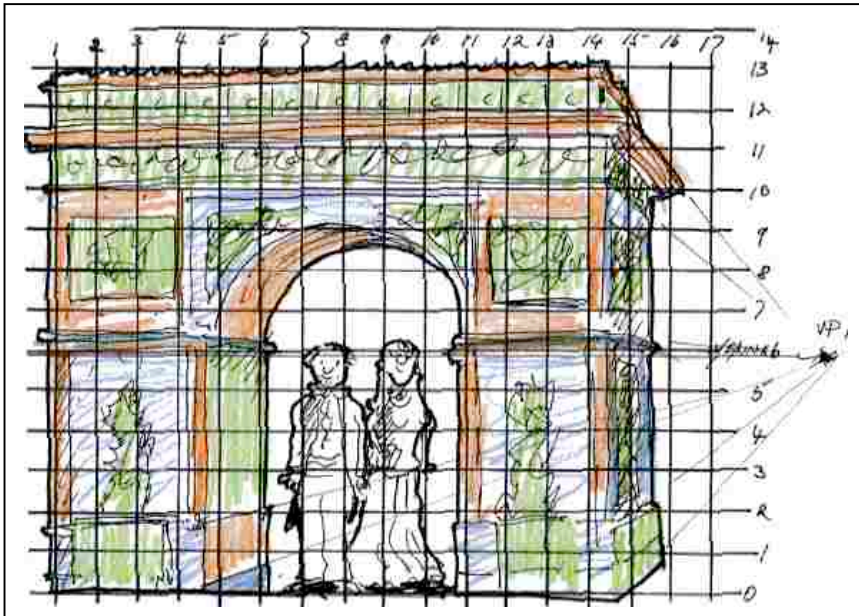
One design consideration is - am I going to cover all of the door frame or let some of it be seen? *I shall assume I will cover as much as I can.* But here is a problem - superimposing an arch over a square door frame.



I have put in the scale so that if your monitor resolution is different from mine then, although the "paper" scale will no longer be one centimetre, the "world" scale will remain the same. So now, knowing my arch measurements, assuming I want to whole thing to be in correct proportions, then the rest of the measurements fall into place. In reality with the above drawing I have squashed the arch down a little. Also I must beware of people knocking their heads on the arch at the sides. You'll see I have drawn in the horizon/eye line and the vanishing point. This geometry is to the same scale.

**SCALE DRAWING** I now draw my arch scenery out to scale. (I use 1cm :1foot). The size of this arch almost works itself out automatically. People have to walk through it - ergo the width has to be at least.... ? *and here I would get two people and measure them assuming they are all in finery.* And the height almost certainly 7 feet at the apogee. Of course it can be taller and wider but these are our minimum measurements. Beware I am talking about the height of the actual physical measurement which takes into account the painted thickness of the "underneath" of the arch..

Next I will colour in this sketch. Any colour will do. The colours are only there to help me identify sections when transferring. I now put a one centimetre grid over the drawing and number the squares ready for transferring to the boards. You can now see that my arch will be just over 13 feet high by just over 16 feet wide. Note I have included the profile edge sticking-out sections in these measurements.



## BUILDING AND PAINTING

As I see it, there are least three ways to make this thing.

1/. All canvas (Or calico which is cheaper - Calico not recommended for something which is going to be rolled up lots of times but OK for this one of project). The canvas to be attached to a long pole which in turn is hung above the door. The problem with this solution is the canvas will curl at the edges. In professional theater scenery, canvas with cutouts- foliage for instance- is mounted on a net which is invisible to the audience. Can't do that here.

2/. Canvas mounted on a timber/lumber frame. Good idea but you have to make the arch and any other profile edges out of board for strength and attach (glue/staple) the canvas onto that.

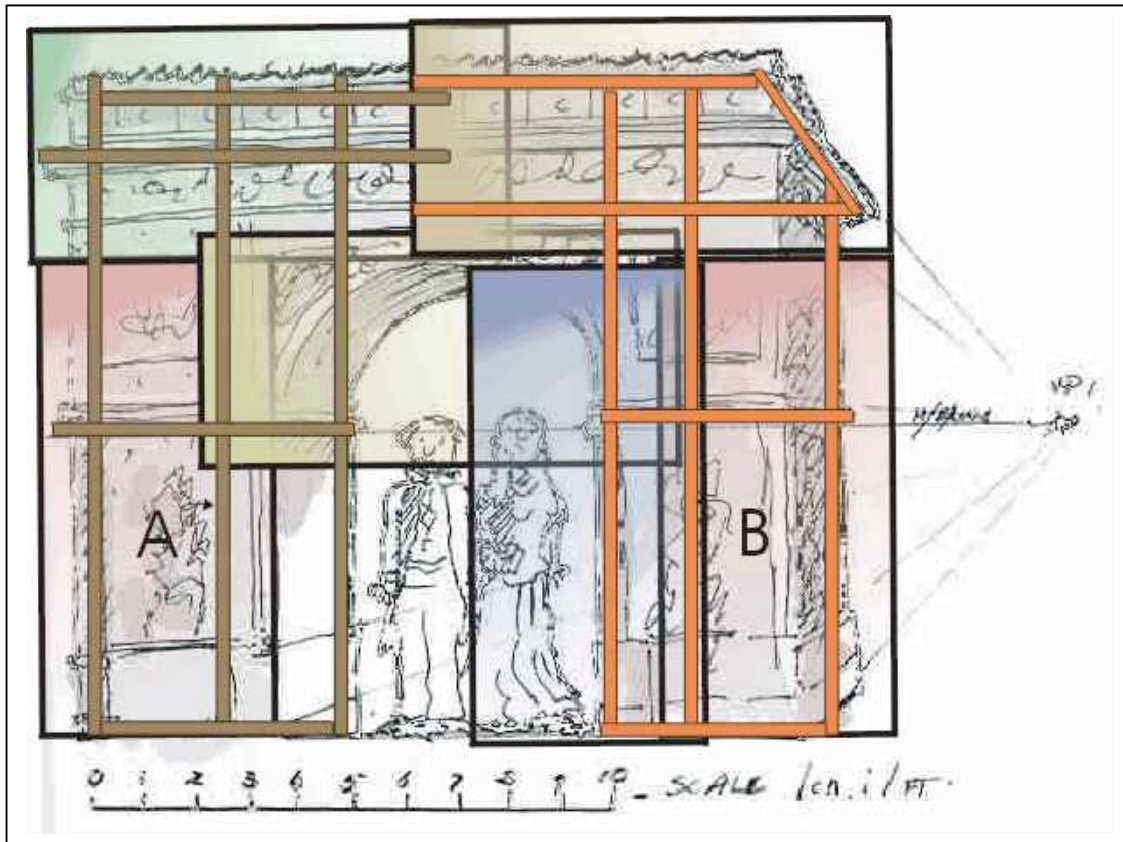
3/. Make the whole thing out of timber frames covered with a very thin (4mm) plywood. I would go for this solution as it means a rigid structure which can have interesting profile edges and can be made in sections which can be bolted/screwed/nailed together on site.

The bottom of an arch proves a problem with built scenery (and door frames as well) and in the theatre is solved by running a very thin metal bar along the floor from one side of the opening to the other and screwed up underneath. Custom bars can be bought from theatrical suppliers and often have a rounded top to help stop actors tripping over them.

## THE STRUCTURE

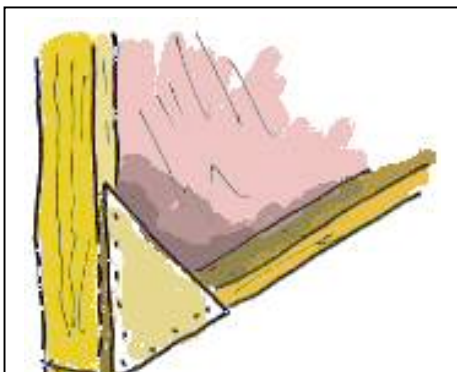
Sheets of plywood in the UK are sold 4 feet wide by 8 feet long. So this project is based around those measurements. Here's how I work out how many sheets I will need and where the supporting frame work is placed. This is done on the scale drawing.

**THE PLY SHEETS** I hope you can make out what is going on here. For the purpose of this web site I have given each sheet a separate colour. The blue one will be cut in half and used for either side of the arch edges. (That's why there's a bit missing on the left hand side in this drawing.) So this makes a total of 6 plywood panels.

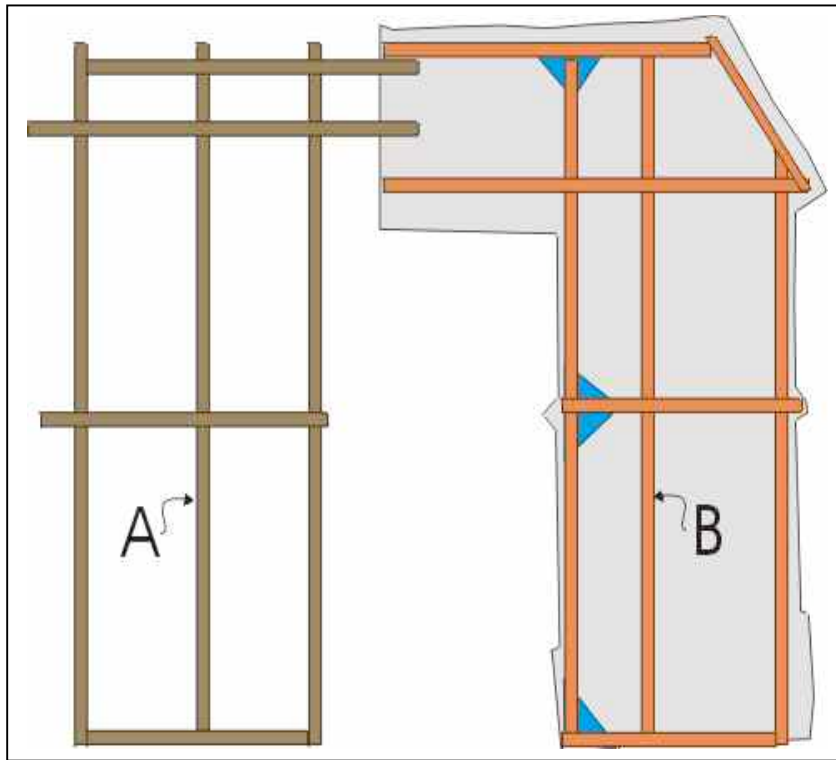


**THE TIMBER SUPPORTS** Will be made from 2" x 1" rough laths. (i.e. not smooth.... not worth the extra cost as no-one will be able to touch it.). I will be making two separate flats. The woodwork goes behind the panels. Pretty obvious, but there have been many times when my drawings have been miss-read by carpenters and the frame has ended up on the front. Easily done - carpenters are not used to reading drawings back to front like this. The uprights labelled A and B are positioned so that the panels can be overlapped at that point i.e. blue on top of pink, and both panels nailed through onto that support.

Now nail your panels into place, overlapping if you wish. The 2"x1" is nailed thin edge to the panels for rigidity (not flat against the panels)



You will then end up with two flats looking like this..



Actually I have only done the right side for you to see what I mean. Things to note:-

- In reality the grey panels are in front of this frame. Not behind it as drawn here.
- The panels protrude a couple of inches over the framing all around, apart from the bottom. The panels are not cut out exactly yet.
- The frame timber protrudes in places to help support the protruding pieces of the "arch masonry".
- The blue triangles are off cuts of the same ply nailed across joints at the back of the framing to help the rigidity. You can have lots of these at every corner.
- Note no curved arch panel. Because this is a one-off occasion and because I want the back to be clean and neat for the audience to walk through, I have tried to avoid any support laths being seen. So this arch curve panel will be nailed onto the finished flat once it is built at the School.
- Paint the back of this arch-board white so it easily visible. Or perhaps a "Welcome" sign?
- The overlap of the top boards and laths helps rigidity
- You might have to nail a couple of temporary diagonal laths of wood across these two frames as they will probably wave about and warp when being transported.

**PAINTING AND CUTTING OUT. Note the order. Paint first, then cut out after.** Lay out your two flats on the floor. Face down. Temporarily bolt them together. Turn it over (Dodgy moment as it is vulnerable at this stage) Now prime the panels with a solution of paint, some water and some PVA glue and a little colour (I use red). This colour helps me see when this mixture is well mixed. Also gives me a pinkish base colour on which to chalk lines. Also lay out the separate "Arch-curve " panel on the floor and prime this with the same solution. Allow everything to dry overnight. Now lightly nail the arch-curve into place .I then usually lift the whole thing up and lean against a wall. *Although you can attack it still lying on the floor.* Now chalk on the one foot grid and then transfer the scale lines from your sketch. Put in just the important lines - the rest (the relief sculptures etc.) can be done freehand later. Now away you go and paint the thing.

**JIG-SAW** Once the painting is finished and dry THEN take a jig saw to it and cut out all around the painting. You'll probably then have to sandpaper these rough edges. Now take the three sections apart and transport it to the school and assemble. Praying that your door measurements were correct! Screw on the thin metal bar along the opening under the flats.

Beware, this arch is going to be quite heavy so make sure there are good supports (hooks, ropes etc.) to hold it up. 'Don't want a youngster being hit on the head.

